

Research Paper

## Personalization of Private Outdoor Spaces: A Case Study of an Iranian Affordable Housing

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### Abstract

Home personalization is a way to remedy the monotonous, standardized design of affordable housing, and to make it more congruent with users' tastes, preferences, and lifestyles. Previous research on personalized residential space suggests that private outdoor spaces, especially the front yard, provide an ideal setting for personalization. However, most units of affordable housing do not possess a front yard and current studies rarely give evidence of personalization in other types of private outdoor spaces. Therefore, the first research question is how four main types of private outdoor spaces including the front yard, terrace, balcony, and rooftop terrace compare with respect to the extent to which each type facilitates personalization. The second question is how the physical characteristics of an outdoor open space correlate with the higher levels of personalization. One hundred and eighty private outdoor spaces of an affordable housing complex were surveyed for amount and purposes of personalization through expert inspection of trace measures and interviews with residents. The data were gone through correlational analysis. Results showed that front yard and terrace were the most personalized spaces with two purposes of territorial defense and regulation of social interaction. In contrast, the balcony and rooftop terrace were far less personalized, and mostly with the purpose of improving their practicality. Furthermore, larger amounts of personalization were found to be strongly correlated with adjacency to the entrance and living room, a larger size of space, and its being on the lower levels of a building.

**Keywords:** Personalization, Private outdoor Spaces, Territorial defense, Social interaction, Practicality.

### 1. INTRODUCTION

Home personalization is known to create the opportunity for residents to express their identity, status, and preferences (Rapoport, 1982). Encouraging personalization as a way to achieve a distinctive, variable, and responsive environment becomes more important in places designed without user participation (Rapoport, 1982) (Bently, Alcock, Murrain, McGlynn, & Smith, 1985). One prominent example is affordable mass housing whose standardized monotonous design permits low self-

expression and ignores the diverse needs of its inhabitants (Habraken, 1972) (Davis, 1997). Budget and time constraints force architects to design repetitive housing units for various users. However, the problem of incongruence between users' needs and mass housing design may be solved in the post-occupation phase if the architecture provides the setting for personalization. Therefore, the overall research problem is what home space with what physical characteristics can facilitate personalization.

Both interior and exterior of a dwelling are subject to personalization, though, this research deals with the latter, as users' interventions in outdoor spaces are more effective in changing the image of a repetitive mass housing to a residential environment

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of diverse units with distinctive characters. Previous research often focuses on private outdoor spaces, especially front yards, for the study of personalization behavior and shows that it is an ideal setting for expressing residents' identity and preferences (Abu-Ghazze, 2010) (Brown, 1985) (Esquer & Eugenia, 1986) (Tames, 2004) (Werner, Peterson-Lewis, & Brown, 1989). Therefore, this research, in an attempt to build upon current studies, investigates personalization behavior in private outdoor spaces of a case of Iranian affordable mass housing. It can close the gap in previous research in two respects.

First, while ground floor units of an apartment building in a mass housing project possess a front yard, above-ground units enjoy other types of private outdoor spaces. Few researchers, among whom are Brand (1995) and Tipple (2000), have investigated personalization instances in these types of spaces. Therefore, we studied personalization behavior in four types of private outdoor spaces including the front yard, terrace, balcony, and rooftop terrace.

Second, while researchers have mostly investigated the link between personalization and human factors such as satisfaction, group membership, ownership, permanence, and the like (Edney, 1972) (Becker, 1973) (Greenbaum & Greenbaum, 1981), we focus on its relationship with physical characteristics of a place. With this approach, we endeavor to suggest design guidelines for facilitating personalization.

## 2. THEORETICAL BACKGROUND

Personalization, as a mechanism of territoriality, has two main purposes of defending the personal territory against invaders and regulating social interaction (Altman, 1975). The first purpose, territorial defense, is accomplished through personalization with recognizable, preventive markers, which act as warning devices to potential invaders and burglars (Becker, 1973) (Newman, 1973) (Patterson, 1978) (Brown & Altman, 1983). Brower, Dockett, and Taylor (1983) showed that based on the residents' perception of the crime rate in the area, they may mark their territory using either symbolic barriers or actual barriers. Symbolic markers include landscaping, hedge, welcome mat, nameplate, fence, and painting while actual ones are comprised of high wire fence, window railing, lock, alarm, and the like (Brower et al., 1983). Although in defending a territory and controlling access to it, people communicate the fact of legitimate occupancy to others (Sommer & Becker, 1969; Becker, 1973), legal ownership is not necessarily required. Tames

(2004) demonstrated that marking with personal possessions could occur in non-private areas contiguous to the dwelling unit as a sign of propriety feeling. Another component of territorial defense is controlling residents' information to maintain their privacy, enabling them to perform their everyday functions without disturbance or unwanted social contacts (Pastalan, 1970) (Altman, 1975). Maintaining one's privacy encompasses visual obstruction as well, which could be achieved by planting, putting up a wall, adding a patio cover, or providing a transition space (Tipple, 2000).

Personalization with the second purpose, regulating social interaction, mostly occurs through expressing communal, group, and individual identities of residents. Regarding communal identity, residents convey their accessibility to others and cohesion with fellow neighbors using personalization at the house front, which is visible to passer-bys (Werner et al., 1989). The home's overall design, location, and material as well as markers such as furniture and decoration are shown to be the indicators of residents' communal identity (Gauvain & Altman, 1982) (Brown, 1985). Concerning group identity, people may elicit their membership in a religious, ethnic, or social group through personalization. Greenbaum and Greenbaum (1981) pointed out that occupants increase the complexity and attractiveness of the environment by the personalization of housing exterior to communicate their membership in an ethnic group. Setting a stage for interaction to provide information about occupants is also considered as another component of group membership (Greenbaum & Greenbaum, 1981). With regard to individual identity, people mark their territory to make it distinctive and identifiable (Edney, 1976). Particularly in social housing schemes consisted of repetitive housing units, residents, when given a chance, turn to the personalization of front yards with planting and decoration to make their house distinguishable (Esquer & Eugenia, 1986) (Abu-Ghazze, 2010).

In addition to the two mentioned purposes, personalization may take place with the third purpose of improving the practicality of space. As the personal territory of a house is a place for everyday functions, some of which are only possible there, residents frequently adjust it for their changing needs and improve its congruence with their lifestyle (Edney, 1976) (Bently et al., 1985). Owing to the instrumental rather than expressive function of such interventions, these have seldom been considered as personalization. However, firstly, each act of personalization could simultaneously convey multiple functions - instrumental and expressive.

Secondly, improving the practicality of space could turn into a powerful incentive for the personalization of affordable housing in which people are not capable of moving if the current dwelling does not meet their requirements (Tipple, 2000). Studies report that low-income residents may extend their house to its immediate private outdoor area to achieve larger space, transform their front yard into a home-based enterprise or a storefront, change the arrangement of space to adjust it for better use, and take possession of the adjacent non-private area to house extra activities (Brand, 1995) (Tipple, 2000) (Tames, 2004) (Sazally, Omar, Hamdan, & Bajunid, 2009).

Based on the accounts given above, one of the most personalized settings in a house is its exterior, an important part of which is private outdoor space. The front yard, as a transitional space between private indoor space and a public outdoor one, is instrumental in maintaining privacy (Tames, 2004) and contributes to territorial defense through personalization with fences, hedges, plates, etc. (Newman, 1973) (Brown & Altman, 1983) (Brown, 1985). Other private outdoor spaces including terraces and balconies also play a part in forming the exterior appearance of a home, and therefore, are the target of social commentary. Therefore, they provide a setting for communicating residents' inclinations and values by acts of personalization such as decoration, embellishment, keeping the place clean and orderly, and enhancing its attractiveness and complexity (Greenbaum & Greenbaum, 1981) (Esquer & Eugenia, 1986) (Werner et al., 1989). Furthermore, private outdoor space as a raw space with a dispensable function is a perfect setting for easy, inexpensive, extending, and capturing extra habitable space to release the housing pressure and improve space practicality (Brand, 1995; Tipple, 2000).

### **3. AIMS AND HYPOTHESES**

The general aim of this study is to investigate the capabilities of different types of private outdoor space in serving the three purposes of personalization. Considering that not all units of multifamily apartment housing do possess a front yard, our first goal is to compare the personalization amount and purposes in different types of private outdoor spaces, including a terrace, a balcony, a rooftop terrace as well as a front yard.

Furthermore, we try to investigate the physical characteristics of a private outdoor space, which are conducive to personalization. Tames (2004) has already shown that available open space with direct access to the dwelling gives rise to personalization.

Skjaeveland and Garling (1997) have also demonstrated that larger outdoor space, with ample sunshine, in lower levels of a building can facilitate users' interventions. However, it is logical to assume that besides adjacency to the entrance area, size, level, and geographic direction of outdoor space, other physical characteristics of outdoor space may facilitate or hinder personalization. Thus, the second goal is to discover the correlation between the physical characteristics of a private outdoor space with the amount and purposes of its personalization.

### **4. METHOD**

This research is a post-occupancy evaluation of a specific behavioral response. To achieve the first goal, we compared personalization instances in different types of private outdoor space. This can be studied through observation of trace measures left by residents in their dwellings to learn about how the physical environment is used (Sussman, as cited in (Gifford, 2016, p. 11)). We conducted a survey, which provided a great deal of data in a standardized and quantitative fashion (Wener, McCunn, & Senick, as cited in (Gifford, 2016, p. 255)). Previous research on personalization has also taken the benefit of such quantitative measures (Esquer & Eugenia, 1986) (Brown & Altman, 1983) (Greenbaum & Greenbaum, 1981).

For the second goal of the research, we pursued the relationship between the physical characteristics of a private outdoor space and the instances of personalization to arrive at the specific design guidelines. This type of study is similar to William Whyte's study of urban plazas in New York City (1970) and Oscar Newman's research of public housing in the same city, both of which sought to clarify the relationship between physical characteristics and behavioral responses in a correlational study (Groat & Wang, 2013, pp. 263-310). Correlational research benefits from observational methods, such as surveys, in collecting quantitative data to predict how a change in key variables may be correlated with the change in behavioral responses (ibid: 280). Therefore, we used this method in showing how various alterations in the physical characteristics of a private outdoor space may give rise or decline to the personalization behavior of residents.

#### *4.1. Sampling*

The goals of the research require a case study consisting of various types of private outdoor space

with diverse physical characteristics to make the comparison between their personalization instances possible. Affordable mass housing in Iran is mostly designed and built with one or two unit types, which offers low diversity in private outdoor space types. However, there is a rare case of such housing at the outskirts of the city of Mashhad, which not only provides four types of private outdoor space for the majority of its housing units but there is a diversity in the physical characteristics and situation of these outdoor spaces.

This mass housing project is called Armes Housing Complex. The complex encompasses four identical sub-divisions, each containing 189 housing units (Figures 1 and 2). Twenty-eight units are without any open spaces while 161 units of each sub-division possess 180 private outdoor spaces. Nineteen out of these 161 units enjoy two private outdoor spaces- a terrace and a balcony or a front yard and a balcony.

We focused the survey on these 161 housing units in the northern subdivision of the complex. However, approximately half of the units (86 units) were either unoccupied or had temporary residents. This proportion is expectable in mass housings on the outskirts of a city where the length of residence is relatively short. In addition, Mashhad is a pilgrims' destination that attracts many temporary residents. As the residents of another 38 units were unwilling to let us in to watch and document their interventions, we were able to collect the data on only 37 units at the end of the first phase. Due to the importance of

recording the personalization in spaces with different physical characteristics and because all four sub-divisions are identical, we marked those unrecorded units on a plan and filled their information by collecting data from their identical units on the other three sub-divisions of the complex. In the end, the data on the personalization of all 180 private outdoor spaces in one sub-division of the complex were collected. These spaces are in five following types.

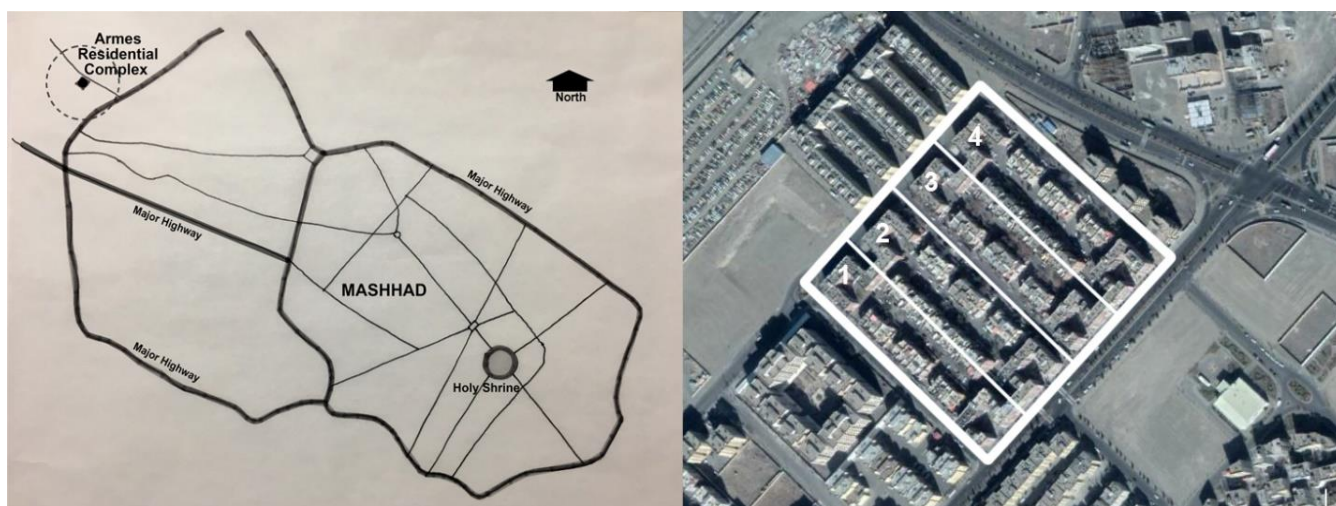
*Front yards* (n=44), with an area of 16 to 40 square meters (Mode= 40 m<sup>2</sup>) are officially non-private places, but the ground floor units have the legitimate right to use them personally.

*Terraces* (n=22), with an area of 17 to 38 square meters (Mode= 27 m<sup>2</sup>) are in stepped buildings where an upper floor is set back from the floor below it. They are not enclosed by any walls or a roof.

*Balconies* (n=83), with an area of 1 to 4 square meters (Mode= 2 m<sup>2</sup>) are semi-open spaces surrounded by walls and a roof.

*Extra Balconies* (n=19), are essentially the same as balconies with an area of 1 to 5.5 square meters (Mode= 3 m<sup>2</sup>). Nineteen out of 62 duplex units, which have a front yard or a terrace as the main outdoor space, possess this small balcony as the second outdoor space.

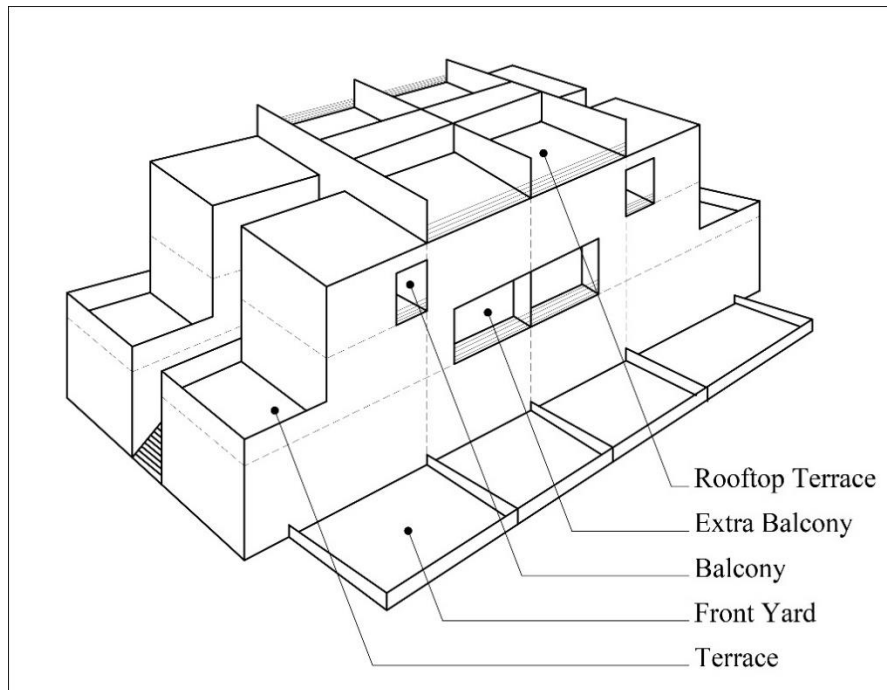
*Rooftop terraces* (n=12), with an area of 40 to 45 square meters (Mode= 40 m<sup>2</sup>) are discrete segments of roofs that are allocated to the personal use of residents of top floor units and have private means of accessibility (Figure 3).



**Fig 1.** (Left) The Location of Armes Residential Complex in Mashhad; (Right) the Aerial View of Armes and its Four Identical Subdivisions



**Fig 2.** Ground Floor Plan of the Northern Subdivision of Armes Residential Complex  
(Courtesy of Naghshan Consultant Engineers, Mashhad, Iran)



**Fig 3.** Five Types of Private Outdoor Spaces in Block no. 1 of Armes Housing Complex.

In addition to physical differences between the types, there are also minor discrepancies in the characteristics of samples within each group. These differences are influential in the process of predicting the effect of environmental design on personalization. Extracted from architectural documents of the complex, variations in physical characteristics of private outdoor spaces are as follows. Size: 1 to 45 m<sup>2</sup>; Level: ground floor to the fourth floor; Geographical direction: north, east, west, and south; View to inside or outside of the complex; Adjacency to the entrance, living room, bedroom, kitchen, or completely separate in the case of rooftop terraces.

#### 4.2. Survey

Primarily, we recognized and recorded the prevalent acts of personalization through both an overall inspection of the environment and a pilot study on the most repeated housing block (i.e. Block No. 1) which also possesses all five types of private outdoor space (Figure 3). Secondly, we prepared an inventory checklist in the form of a table similar to our measuring device (See Appendix 1). Listed in the columns of the table are the present signs of personalization and listed in the rows are the three purposes of personalization and their key components, which are categorized based on the

discussed literature, and coded from A1 to C3 as below.

*A. Territorial defense* with five components including A1) deterring potential invaders with actual barriers, A2) providing a sense of security with symbolic barriers, A3) communicating the fact of legitimate ownership by controlling access, and A4) expressing propriety feeling in non-private areas; A5) providing and maintaining the privacy and visual privacy.

*B. Regulate and facilitate social interaction* with four components including B1) expressing communal identity and conformity in places visible to others, B2) communicating group identity by increasing attractiveness and beauty of the place with markers acceptable to acquaintances, B3) setting the stage for interaction by making spatial rearrangement, and B4) expressing individual identity and differentiation by showing taste and personal preferences.

*C. Improve practicality* with three components including C1) transformation of a private outdoor space to an entirely enclosed area, C2) extension of adjacent space (living room, kitchen, bedroom) to the private outdoor area, and C3) Adjustment for use by furnishing, climatic control, increase the safety of the place (see Appendix for inventory checklist).

The table records frequency counts. Although this type of dichotomous measuring cannot record the extensiveness of each intervention, it increases the inter-rater agreement as the rating system is not based on subjective judgment. Then, we registered the data in the inventory checklists, with the help of three research assistants who were trained in the survey procedure. The interviewees were the female head of each family because women are more involved in

home personalization, recalling more activities than men do and, furthermore, an interviewee group of the same gender and role increases the consistency in the results. In addition, we benefited from female assistants as they appear more trustworthy for letting in the house and the interviewees may feel more comfortable in talking to someone of their own sex. They called on each unit's door on weekends so that they could catch residents at home when they have more free time to answer the questions (Table 1). In two out of 161 units, the elder daughter and in one case, a bachelor living alone answered the questions.

In the survey, we focused on measuring the number of times each of the 12 components of personalization was realized. Three assistant researchers detected the instances of personalization when observing each private outdoor space, asked the interviewee about its purpose, and recorded them in a separate inventory checklist for each space. For example, when an opaque screen was used at the edge of a front yard and the resident stated its purpose as maintaining the visual privacy of the family (Figure 4), a number (1) was added to the cell A5-Sc (See Appendix 1). As each act of personalization may simultaneously convey multiple purposes, the overall amount of each component is higher than the number of acts of personalization. For example, when residents used plantations to provide privacy and differentiate themselves from others at the same time (Figure 5), both A5-P1 and B4-P1 were assigned a count of 1. Then, the measurements of components were added together to determine the amount of each of three purposes as well as the overall amount of personalization in each private outdoor space.

**Table 1.** The Physical Characteristics of the Surveyed Housing Units (Courtesy of Naghshan Consultant Engineers, Mashhad, Iran), the Interviewees' Demographics, and Their Housing Condition

	Range	Mean	Std. Deviation
Area of the unit (m <sup>2</sup> )	43-106	74.93	18.48
No of Rooms	1-3	1.95	0.68
No of Occupants	1-6	3.15	1.19
No of Children	0-4	1.36	1.00
Age of the female head of the family	21-65	38.41	10.83
Residence length	1 month to 14 years		
Ownership Status	Owner (51.9%) - Rented (44.8%)		
Anticipatory Residence	Yes (34.4%) - Perhaps (8.4%) - No (24.0%)		



**Fig 4.** Opaque Screen at the Edge of the Front Yard Obscures Visual Access of the Passersby



**Fig 5.** Climbing Plants at the Edge of the Front Yard Maintains Privacy and Provides Distinction

To measure the agreement between the data gathered by three raters, we conducted the Cohen's kappa test (McHugh, 2012). First, 25 out of 180 private outdoor spaces (5 of each type) were randomly selected, and the three assistants investigated all of them simultaneously while they submitted the data to different checklists. Then, we performed the test three times, each checking the agreement between the results of two rates. The tests showed three values of 0.861, 0.952, and 0.882, all of which achieved the approximate significance of 0.00. These verified the reliability of measurements and that there is a negligible inter-rater disagreement.

#### 4.3. Analysis Procedure

measurements were near 0. Firstly, while providing a sense of security (A2) was accomplished by symbolic barriers, residents used actual barriers such as walls, high fences, and doors to secure their property, all of which were included in A1 (detering potential invaders). Secondly, residents refrained from interventions in non-private areas (A4), either because of their unwillingness in putting personal possession in a non-private territory or due to the strict municipality regulations on maintaining the boundary of land. Finally, Cronbach's test was performed to test the internal consistency of 10

components of personalization, which resulted in the Alpha of 0.814.

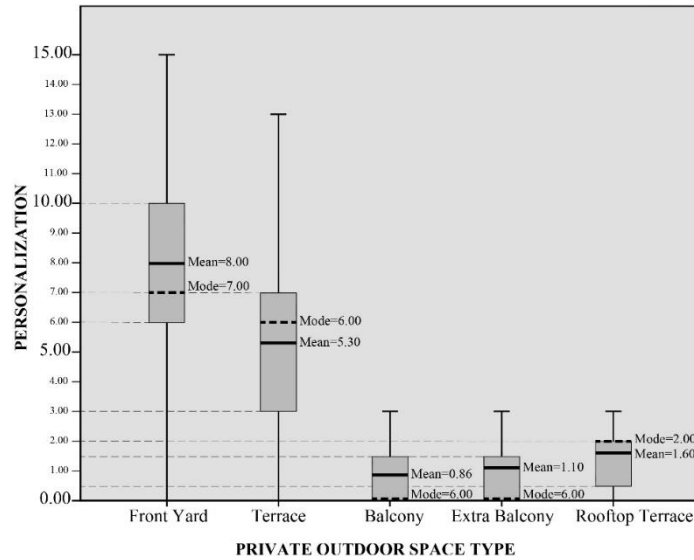
Two discrete dependent variables were calculated to make comparisons possible: the percentage of each of 12 components in each type of private outdoor space (Table 2: column percentage), and the proportion of each one in different types of private outdoor space (Table 2: row percentages). For the latter case, as the number of samples in each type of private outdoor space was different, mean personalization was used as the base of calculations. Furthermore, bivariate correlations were computed to investigate the possible links between physical characteristics of private outdoor space and the amount of personalization in each of the 12 components. Due to the nominal scale of some groups of data together with non-linear relations between two sets of variables, Spearman correlation was employed (Table 3).

## 5. FINDINGS AND ANALYSIS

Figure 6 represents the amount of personalization performed in each type of private outdoor space and its distribution. The largest amount of personalization has been recorded in front yards with an average of 8.02 per space, followed by terraces, which show an average of 5.32 personalization per space. In

comparison, three other types of private outdoor spaces are far less personalized (approximately 1 per space), the least of which is the balcony with an average of 0.84. Moreover, the mode of personalization in balconies and extra balconies is 0. Reasons for the discrepancy in the amount of personalization of different types of private outdoor

spaces will be discussed below based on Tables 2 and 3. Table 2 demonstrates the proportion of each purpose and component of personalization in all interventions performed in each type. Also, Table 3 shows which physical characteristics of space correlate with the amount of personalization and its purposes.



**Fig 6.** The amount of Personalization and its Distribution in Five Types of Private Outdoor Spaces

**Table 2.** The Proportion of Purposes and Components of Personalization in the Five Types of Private Outdoor Spaces

Types of Private Outdoor space	Front Yard		Terrace		Balcony		Extra Balcony		Rooftop Terrace			
	Sum	Column%	mean	Row %	Sum	Column%	mean	Row %	Sum	Column%	mean	Row %
A) Defense Against Invaders	130	36.8%	2.95	60.0%	23	19.6%	1.05	21.0%	20	27.7%	0.24	4.9%
A1- Defense Against Invaders	35	9.9%	0.8	68.9%	5	4.2%	0.18	15.5%	2	2.7%	0.02	1.7%
A3- Legitimate Occupancy	35	9.9%	0.77	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
A5- Privacy	55	15.5%	1.25	44.6%	18	15.4%	0.82	29.3%	18	25.0%	0.22	7.8%
B) Regulate Social Interaction	161	45.6%	3.66	49.5%	56	47.8%	2.55	34.6%	17	23.6%	0.22	2.9%
B1- Communal Identity	40	11.3%	0.91	68.4%	8	6.8%	0.36	27.0%	4	5.5%	0.06	4.5%
B2- Group Identity	50	14.1%	1.14	52.5%	17	14.5%	0.77	35.5%	2	2.7%	0.02	0.9%
B3- Stage for Interaction	14	3.9%	0.32	30.4%	10	8.5%	0.45	42.8%	0	0.0%	0	0.0%
B4- Differentiation	57	16.1%	1.3	46.1%	21	17.9%	0.95	33.7%	11	15.2%	0.13	4.6%
C) Improve Practicality	62	17.5%	1.4	29.8%	38	32.4%	1.73	36.7%	35	48.6%	0.42	8.9%
C1- Transformation	12	3.4%	0.27	33.7%	4	3.4%	0.18	22.5%	6	8.3%	0.07	8.8%
C2- Extension	2	0.5%	0.05	14.2%	4	3.4%	0.18	51.4%	1	1.3%	0.01	2.8%
C3- Adjustment for use	48	13.6%	1.09	30.1%	30	25.6%	1.36	37.7%	28	38.8%	0.34	9.4%
<b>Total Personalization</b>	<b>353</b>	<b>100%</b>	<b>8.02</b>	<b>47.3%</b>	<b>117</b>	<b>100%</b>	<b>5.32</b>	<b>31.4%</b>	<b>72</b>	<b>100%</b>	<b>0.84</b>	<b>4.9%</b>

Note. Sum= the number of times each purpose and component of personalization is recorded in each type of private outdoor space. Column % = the proportion of three purposes and 12 components of personalization in each type of private outdoor space. Mean= the average amount of each purpose and component of personalization in each private outdoor space. Row%= the proportion of each purpose and component of personalization in five types of private open space.



**Table 3.** Bivariate Correlation between the Physical Characteristics of Private Outdoor Spaces and the Purpose of Personalization

Purposes and components of personalization	Physical Characteristics of the space		Adjacency				Daylight/ Geographical Direction				View		Location in the Block		
	Size	Level	Entrance	Living Room	Kitchen	Bedroom	South	North	East	West	Up (Rooftop Terrace)	Inside Complex	Outside Complex	Middle	Corner
A) Defense Against Invaders	.498**	-.607**	.736**	.660**	-0.029	-.550**	0.057	0.061	-0.054	-0.011	-.174*	.188*	-.188*	-.294**	.294**
A1- Defense Against Invaders	.444**	-.531**	.697**	.581**	-0.104	-.435**	0.146	0.085	-0.055	-.178*	-.147*	0.108	-0.108	-.190*	.190*
A3- Legitimate Occupancy	.451**	-.640**	.831**	.609**	-0.083	-.481**	.183*	0.058	-0.104	-.159*	-0.131	0.104	-0.104	-.163*	.163*
A5- Privacy	.425**	-.508**	.596**	.562**	0.021	.497**	0.049	-0.03	-0.026	0.069	-0.115	.170*	-.170*	-.294**	.294**
B) Regulate Social Interaction	.492**	-.409**	.617**	.627**	0.057	-.639**	-0.08	0.099	-0.089	0.048	0.006	.174*	-.174*	-.325**	.325**
B1- Communal Identity	.345**	-.530**	.646**	.557**	0.078	.504**	0.08	0.004	-0.07	0.037	-.151*	0.141	-0.141	-.278**	.278**
B2- Group Identity	.451**	-.431**	.600**	.625**	0.025	-.557**	0.028	0.081	-0.047	-0.04	-0.122	.193**	-.193**	-.296**	.296**
B3- Stage for Interaction	.260**	-0.143	.233**	.302**	0.084	-.347**	-0.14	0.082	0.048	-0.017	0.023	0.138	-0.138	-.220**	.220**
B4- Differentiation	.386**	-.349**	.539**	.538**	0.017	-.509**	-0.1	0.104	-0.038	0.064	-0.041	.169*	-.169*	-.314**	.314**
C) Improve Practicality	.354**	-.178*	.308**	.338**	.153*	-.417**	-0.77	0.062	-0.071	0.07	0.022	.238**	-.238**	-.238**	.238**
C1- Transformation	.153*	-0.117	.186*	0.125	0.011	-0.137	-0.1	0.067	-0.024	0.023	0.048	.178*	-.178*	-0.026	0.026
C2- Extension	.153*	0.019	0.002	.169*	0.043	-.157*	-0.02	0.04	-0.002	0.026	-0.058	.151*	-.151*	-0.061	0.061
C3- Adjustment for use	.299**	-.151*	.282**	.272**	.153*	-.367**	0.054	-0.01	-.154*	0.089	0.021	.147*	-.147*	-.242**	.242**
Personalization	.514**	-.494**	.669**	.664**	0.073	-.629**	-0.02	0.09	-0.079	0.018	-0.063	.245**	-.245**	-.366**	.366**

Note. \*p< .05. \*\*p< .01.

Correlations greater than 0.400 are demonstrated in boldface.

### 5.1. Front Yard

Physical characteristics of the front yard, including large size, adjacency to the entrance, and situating on the ground floor, all show strong correlations with the first two purposes of personalization and a low correlation with the third purpose indicating a suitable setting for personalization (Table 3). In comparison with other types of private outdoor spaces, the highest amount of territorial defense has occurred in front yards (60%) with all its three components rating the first (Table 2: row percentages). A large amount of personalization of front yards was expected given front yards face more invasion than the other four types. However, amongst three purposes of front yard personalization, territorial defense comes second to regulating social interaction with 36.8% to 45.6% (Table 2: column percentages). Deeper investigation of the data revealed that 55% (89 out of 161) of the personalization for purpose B is associated with the acts that fulfill both purposes of A and B. For instance, residents have used climbing plants on

fences to provide both visual privacy (A5) and to relay a sense of beauty and worth (B1). Thus, in accordance with previous research (Greenbaum & Greenbaum, 1981), this research shows that both territorial defense and regulating social interaction are the main drives for personalization of front yards

Regarding the key components of territorial defense, providing privacy (A5) is on the top of the list of front yards personalization. Excluding two cases where inhabitants marked the boundary of space with flower boxes, they have entirely separated front yards from the public territory with either a solid wall or high fences covered with climbing plants. Residents' concern for visual privacy is also reflected in measures taken to block the visual contact from neighboring houses' windows such as planting tall trees and installing a pergola covered with plants. Religious and cultural backgrounds certainly played a significant role in the essentiality of visual privacy without which front yards were deemed unsuitable for everyday use.

Concerning the key components of regulating social interaction, most interventions are done for to

express individual and group identities. The high rate of expressing individual identity (B4) in almost all types of private outdoor spaces is because whatever the primary purpose of an act of personalization was, it often indicated taste and differentiation. Additionally, given the small size of housing units and the ample proportions of front yards, this space was considered an ideal setting for family gatherings and meeting with relatives, which has given rise to its personalization with the markers indicating group identity (B2).

On the other hand, setting the stage for interaction (B3) has achieved a fewer portion of front yards personalization (3.9%). The small amount of B3 might be because front yards, besides being an interactional space, are required to be capable of a wide range of other functions such as parking, carpet washing, heavy cooking, etc. Therefore, residents have mostly refrained from marking a part of it as a seating area to maintain its flexibility. The same reason together with shared ownership of front yards may explain the low amount of interventions to improve their practicality. Only in 11 cases, residents have transformed a small segment of front yards into a storage area (C1), and just in 2 cases, they have partly extended living rooms into front yards (C2). Albeit some furniture was put in front yards to adjust them for use (C3), purpose C is at the bottom of front yards personalization.

## 5.2. Terrace

In facilitating personalization, the terrace is second only to the front yard in both ratings of territoriality defense and regulating social interaction. Findings showed that terrace personalization, similar to front yards, is mostly done to regulate social interaction with 47.8% (Table 2: column percentages). Though in contrast with front yards, regulating social interaction (B) is the sole purpose of 75% of this amount, and the other 25% is shared with the second purpose of improving practicality (C).

The considerable amount of purpose B in terraces is consistent with its strong correlation with adjacency to the living room (0.627) and large size (0.492), both of which make terraces suitable for interactional activities. Sixteen out of 22 terraces were attached to living rooms, all of them with the floor to ceiling windows. While living rooms were quite small (at most 24 m<sup>2</sup>) with both functions of family relaxation and entertaining guests, these tall windows were instrumental in enhancing the feeling of living room spaciousness and extending its activities to the outdoor space. Therefore, terraces become a perfect setting for those acts of

personalization which not only improved the view of living rooms but invited positive comments from guests. Thus, expressing individual and group identity (B2 and B4) in terraces, by putting potted plants, furniture, embellishment, and decoration achieved highest levels of purpose B.

In comparison with B2 and B4, expressing communal identity (B1) has motivated less personalization. The outside edge of terraces, where conveying communal identity to others could be materialized, are mostly obstructed with either opaque screens, or curtains, or even cardboards to provide visual privacy (A5). It was apparent in terraces that providing a comfortable space for everyday use was more important than either attracting others' favorable comments or enhancing the outlook of the whole complex. On the other hand, setting the stage for interaction (B3) is realized more frequently in terraces than front yards, although its occurrence is not high (0.45 per space). The increase in B3 might be because terraces are more dispensable and changing their arrangements does not obstruct any essential function.

After regulating social interaction, improving the practicality of space has inspired the most personalization in terraces, while it shows low correlations with adjacency to the living room (0.338) and size (0.354). As interactional spaces, some terraces have been adjusted for sitting, playing, and sleeping. Respective interventions include furnishing, closing the outside edge of space with window walls or plastic covers to make it climatically comfortable, and installing fences to increase its safety. As a result, not only adjusting for use (C3) has acquired the highest amount of purpose C in terraces but also in comparison with other four types of private outdoor space, purpose C and component C3 were most realized in terraces. However, similar to front yards, transformation and extension have motivated very few personalization in terraces. Only in four cases, occupants have transformed a small portion of terraces into a storage area, and in another four cases, they have extended living rooms into terraces. These results are in contrast with Brand's (1995) and Tipple's (2000) theories indicating the suitability of terraces for extension and transformation. One of the factors that may have hindered enclosing the outdoor space is residents' desire to possess a private open space. Moreover, we assume that residents' short length of residence (average: 4 years) together with strict municipality regulations have deterred structural interventions.

### 5.3. Balcony

Amongst five types of private outdoor spaces, the balcony made for the most unlikely setting for personalization given all its physical characteristics were negatively correlated with the three purposes. Balconies' small size and the adjacency of 79% of them to bedrooms hampered their chance of becoming an interactional place. Moreover, they were situated on the upper floors of a building and mostly in the middle of a block, both of which lessen their visibility, accessibility, and hence, the need for territorial defense (Table 3).

Residents' interventions in balconies chiefly concern using them as outdoor storage areas. While statistics indicated that half of front yards and terraces were partly used for storing food and housewares, 74% of balconies were specified to an outdoor storage area, with 6 of them completely transformed into an indoor storage room. At this stage, we formed the assumption that the lack of a storage room might be a factor in advancing the behavior of storing household articles in balconies. However, no significant difference was found in the way balconies were used between units with a storage room and those without. This might be because the size of the inside storage room (0.4 to 3.6 m<sup>2</sup>) was inadequate for the needs of a household that possess a small housing unit (43 to 106 m<sup>2</sup>). Also, balconies inherently provide a suitable place for storing goods considering their size, dispensable function, access to fresh air, and the like. However, to protect the storage from temporary harsh climatic conditions, most residents have covered the balcony's open side with windows or plastics. These actions together with fences installed for the safety of children have caused adjustment for use (C3) to be the major component of balcony personalization. Looking into all interventions with the purpose of adjustment for use revealed that climatic protection is the primary concern of households. Furnishing, taking safety measures, and shielding against dust came respectively second to fourth. The location of the Armes complex could be a contributing factor here as it is situated on the outskirts of the city, surrounded by open land and few scattered buildings. Consequently, housing units of Armes face undesirable wind much more than a house in the city center. Hence, they require more protection.

As housewives used storage on balconies on a daily basis, they have made interventions such as hanging a curtain to provide visual privacy (B5). However, none of the mentioned actions were executed with any concern for beauty as balconies performed more an instrumental function than an

expressive one. Amongst 72 personalization recorded in balconies, only 17 indicated that putting potted plants, which made regulation of social interaction, were the least realized purpose of balcony personalization.

### 5.4. Extra Balcony

We expected that possessing an extra balcony would provide a better opportunity for residents to personalize their main outdoor space (i.e. front yard or terrace), as this second open space can shoulder instrumental functions such as storing housewares and food. To test this assumption, we compared the variance of personalization in two groups of private outdoor spaces, one of which belonged to units with an extra balcony and the latter belonged to those without an extra balcony. A one-way ANOVA test, which resulted in the significance of 0.633, indicated that the presence of an extra balcony did not change the amount of personalization in the main outdoor space. Besides, Table 2 shows that the overall amount of personalization in extra balconies did not differ significantly from balconies. Therefore, we assumed that similarity in physical characteristics of both groups may play a leading role in their rate of personalization.

The only difference between personalization of extra balconies and balconies emerged from two extra balconies which were joined with their adjacent living rooms, personalized at the same time as indoor interactional places. As there was no extension in 12 balconies adjacent to living rooms, we conducted a closer inspection of architectural plans. Balconies and extra balconies were both rectangular, though, while balconies were attached to living rooms by their width, extra balconies were connected with living rooms by their length. Therefore, when inhabitants extended the living room to an extra balcony, they achieved a single large area while this was not the case in balconies. Therefore, we assumed that another physical characteristic, namely the geometry of adjacent spaces, may be influential in the personalization of small outdoor spaces.

### 5.5. Rooftop Terrace

Rooftop terraces were owned by duplex units in which there were two floors (i.e. 32 stairs) apart from the living room and kitchen. Notwithstanding their perfect size for interactional activities and high rate of visual privacy, rooftop terraces were deemed uncomfortable for constant use because of the difficulty of access. Not being adjacent with either

living room or entrance space, both of which have strong correlations with purposes A and B, has hindered residents' interventions to express self-identity and defend one's territory. Three out of 12 owners of rooftop terraces were inclined to use them, indicating plans to build a kitchenette and a toilet there, though their plans are constantly postponed as interventions with such fixed elements require spending time and money.

Given the semi-arid climate of Mashhad, the use of private outdoor spaces strongly depends on the season, a factor that affects rooftop terraces the most. Although they are considered pleasant places on summer nights for gathering and sleeping under a clear sky, people abandon them in the other times of the year as bitter cold nights, hot sunny days, and the high wind. Consequently, residents have only transformed a portion of two rooftop terraces into a storage area while the other ones are used as a place to discard old furniture. In one case, even the staircase to the roof was occupied with household articles. In six cases where the rooftop terraces were simultaneously used as a temporary interactional space, occupants have added few surplus pieces of furniture and covered the outside edge of the space to provide visual privacy and climatic protection. Overall, rooftop terraces account for only 9.8% of all personalization, of which the largest amount is for improving its practicality. We speculate that certain factors, including not being easily accessible, low visibility from interactional spaces, and being exposed to harsh climatic conditions have hindered rooftop terraces' personalization.

## 6. DISCUSSION

Results are consistent with previous research on purposes of personalization, validating all three purposes of territorial defense, regulation of social interaction, and improving practicality in personalized spaces. However, the study shows that interventions with the purpose of improving the practicality of space in affordable housing are mostly focused on instrumental functions and seldom lead to good non-chaotic personalization. This study also confirms theories indicating that acts of personalization may have multiple purposes (Edney, 1976) (Brown, 1985; Greenbaum & Greenbaum, 1981) (Brown, 1985), while it furthers them to show that expressing identity is almost always one of these purposes. Thus, regulation of social interaction is realized more than other purposes in overall personalization. In line with the findings of Abu Ghazze (2010) and Esquer and Eugenia (1986) on affordable housing personalization, this research also

demonstrates that attending to one's preferences and attracting good comments from relatives are more important than demonstrating social cohesion and accessibility. On the other hand, the results introduce two alterations to the current understanding of personalization, both of which may be related to the cultural background. First, visual privacy holds considerable significance in the personalization of outdoor areas, one of the reasons might be religious restrictions on women's clothing in public. Second, territorial defense is entirely dependent on actual barriers, not symbolic ones, which might be because of Iranians' traditional notion of private outdoor space as a central courtyard rather than an exposed, outside place.

In response to the first goal of the research, results indicate that as no private outdoor space requires territorial defense as much as front yards, they would not be personalized as much. However, terraces may come close to front yards in inspiring residents' personalization for regulation of social interaction. However, the balcony has proven to be the most unlikely setting for personalization, given its characteristics mostly allow for a storage area. Moreover, rooftop terraces, while primarily perceived as desirable places for interactional activities, do not serve any of the three purposes given their difficult accessibility. These findings are hugely dependent on the physical characteristics of each type of outdoor space.

With respect to the second goal of the research, the physical characteristics of an outdoor space correlate with its amount of personalization, though this correlation needs some clarifications. First and foremost, a private outdoor space adjacent to the entrance or the living room provides plenty of opportunities to pass through and be looked upon, hence, it could inspire residents to enhance it for use and social interaction through personalization. Secondly, an outdoor space on a lower level of a building could motivate more personalization as its territorial defense is crucial. Particularly on the ground floor, the availability of soil may stimulate inhabitants to personalize more with the plantation, which fulfills multiple purposes. Third, a place with a larger size offers more capability for both instrumental and expressive personalization. Lastly, those private outdoor spaces situated on the corner of a block, thus having two outside edges, would be personalized more than those in the middle of a block, probably because they require more interventions to provide privacy. Other characteristics including geographical direction and the view of the private outdoor space, bore no significant correlation with the amount of personalization.

## 7. CONCLUSION

The quality of the residential environment may improve or decline in consequence of user interventions. To increase architects' awareness of factors influencing the personalization of mass affordable housing, this study investigated the traces left by residents in private outdoor spaces of such a residential complex in Mashhad, Iran. The results showed that to increase the chance of post-occupation personalization, a dwelling may be designed with a large private outdoor space close to a home entrance or living room, such as a front yard or a terrace. Such a place is constantly in use and in view, a setting for social activities of a family, and has room to personalize with taste and concern for beauty. However, we suggest that architects avoid designing small, out-of-the-way balconies, most of which turn to storage areas that are personalized haphazardly, contributing to the environmental chaos. Also, outdoor areas that are accessed with difficulty and have no adjacent home space, like rooftop terraces, are no substitute for a lower-level yard, even when they are private and large.

Further research is required to deepen the understandings of this study about each private outdoor space. The effect of adjacency to the living room on the personalization of rooftop terraces needs to be examined as the samples of this study did not provide such an opportunity. Also, the balcony, as the most repetitive outdoor space in the mass housing schemes, needs a broader yet detailed investigation to elaborate how different physical characteristics encourage or deter its personalization.

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## APPENDIX 1

Inventory Checklist for collecting the data on personalization

Unit No.	Block No.	Level	Number of Rooms	Area of the unit	Open Space Size	Geographical Direction	View	Location in the Block	Storage room							
Purposes of Personalization and their Key Components																
				code	Pl	He	Po	Pt	Os	Od	Pr	Pa	Fe	Sc	Do	Ot
					Planting	Hedge	Potted Plants	Playing tools	Outdoor sitting area	Ornaments and Decor	Pergola roof	pavement	fence	Screen	Door	Others
Territorial Defense	Deterring potential invaders; Provide warning device			A1												
	Providing a Sense of security			A2												
	Communicate the fact of ownership or legitimate occupancy; Control over physical access			A3												
	Expressing Proprietary feeling; Control the use of space			A4												
	Providing Privacy: Control over information about dwellers; Visual privacy			A5												
Regulate and facilitate Social Interaction	Communicating Communal Identity; Social conformity and cohesiveness (Increasing complexity and attractiveness associated with social acceptability); Promote favorable social commentary and avoid unfavorable ones; Communicate friendliness and accessibility			B1												
	Expressing group Identity (ethnicity, nationality, religion, political party propaganda, social, economic...); Stage a performance that attracts or repels a certain audience			B2												
	Setting the stage for interaction; Providing relevant information about dweller's social status, dominance and social class			B3												
	Expressing Individual Identity: Portray one's distinction from others; Differentiation			B4												
Improve Practicality	Transformation; Change the use of space; Sub-divisions; Change in space allocation			C1												
	Extension of the built area into the adjacent open space			C2												
	Adjustment for use; Furnishing; Climatic control; Increase safety			C3												

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